

Rapid Estimation of Aircraft Performance Models using Differential Vortex Panel Method and Extended Kalman Filter, Phase II

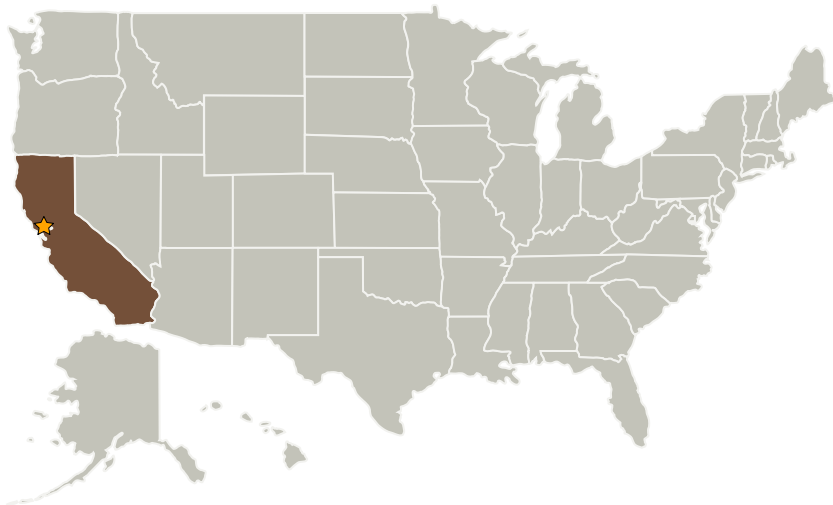
Completed Technology Project (2008 - 2010)



Project Introduction

The problem of estimating the aerodynamic models for flight control of damaged aircraft using an innovative differential vortex lattice method tightly coupled with an extended Kalman filter was investigated during the Phase I research. The approach exploited prior knowledge about the undamaged aircraft to reduce the order of the estimation problem. Probing maneuvers were designed to improve the observability of the system dynamics. The derived performance model was then be used to determine the aircraft flight envelope, performance parameters and the maneuver limits. The estimated data can be used as the basis for designing safe landing guidance laws for damaged aircraft. Phase II research will refine the algorithms developed during the Phase I research and create a standalone software implementation. Structural dynamic computations and control power estimation will be included in the software. Operation of the software will then be demonstrated at near real-time speeds. All the algorithms and software developed under the proposed research will be supplied to NASA at the end of Phase II. Human-in-the-loop simulations and flight test evaluation of the system will be undertaken during the Phase III work.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★ Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Optimal Synthesis, Inc.	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California

Primary U.S. Work Locations

California

Project Transitions

**December 2008:** Project Start**December 2010:** Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - TX15.1 Aerosciences
 - TX15.1.3 Aeroelasticity